

Toth et al.

S/N: 10/782,485

REMARKS

Claims 1-21 are pending in the present application. In the Office Action mailed May 25, 2005, the Examiner rejected claims 9-11 and 15-17 under 35 U.S.C. §103(a) as being unpatentable over Toth et al. (USP 5,450,462) in view of Hoffman (USP 6,113,448). The Examiner next rejected claims 12 and 13 under 35 U.S.C. §103(a) as being unpatentable over Toth et al. and Hoffman, and further in view of Toth (USP 5,379,333). Claims 18-20 were rejected under 35 U.S.C. §103(a) as being unpatentable over Toth et al. in view of Toth.

Applicant appreciates the indication that claims 1-8, and 14 are allowed. Applicant requests consideration and entry of claim 21 which is newly presented herein and incorporates the subject matter of claim 9, as originally presented, and claims 11-14. Applicant believes that claim 21 is in condition for allowance as the Examiner indicated that the subject matter of claim 14 to be patentable over the art of record.

The drawings were objected to as failing to comply with 37 CFR 1.84(p)(4) and 37 CFR 1.84(p)(5). The Examiner objected to reference character 84 for designating both a flexible cable in Fig. 4 and a waveform in Fig. 6. Applicant has amended Fig. 4 to change reference character 84 to reference character 83. The specification has also been amended to reflect the change. The Examiner also objected to the reference character C_L in Fig. 5. Applicant has amended the specification to include the reference character C_L . No new matter has been added.

The Specification was objected to because of certain informalities. Appropriate corrections have been made. Also, claim 14 has been amended to correct a typographical error.

The Examiner rejected claim 9 under 35 U.S.C. §103(a) as being unpatentable over Toth et al. in view of Hoffman. Applicant has amended claim 9 to call for generating at least one polynomial expression fit to values evaluated at the plurality of magnitudes and determining an approximate tube current modulation waveform from the at least one polynomial expression. Neither Toth et al. nor Hoffman teaches or suggests generating at least one polynomial expression fit to values evaluated at the plurality of magnitudes and determining an approximate tube current modulation waveform from the at least one polynomial expression.

Toth et al. teaches that "[a] scout scan is performed to acquire attenuation data which enables an optimal current modulation profile to be calculated for each slice in the scan." Abstract. The scout scan allows a modulation index to be calculated that "indicates the degree to which x-ray tube current can be modulated without significantly increasing noise artifacts in the reconstructed image." Col. 4, lns. 23-26. Toth et al. teaches that "modulation profiles are stored as forty values which, when multiplied by the maximum tube current . . . , provide forty current

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commands for the x-ray controller 22 that determine x-ray tube current at forty successive 9° segments of gantry revolution." Col. 5, lns. 9-15. The forty values are calculated according to Equation 1 using the modulation index. See col. 5, lns. 20-39.

Toth et al. teaches an altered modulation index may be used to produce a clipped modulation waveform when hardware limitations prevent modulation of x-ray tube current below a certain level. See col. 5, lns. 40-45. In this case, the forty current commands are calculated with Equation 1 using the altered modulation index. See col. 5, lns. 46-50. A clipped waveform is calculated by comparing each calculated current command with a minimum current command and replacing the calculated current command with the minimum current command if the minimum current command is greater. See col. 5, lns. 50-65.

While Toth et al. teaches a tube current modulation waveform calculated from forty stored values for successive 9° segments of gantry revolution, Toth et al. does not teach or suggest generating at least one polynomial expression fit to values evaluated at the plurality of magnitudes. Instead, the plurality of magnitude values are stored values and are not generated from a polynomial fit of values evaluated at a plurality of magnitudes. Furthermore, Toth et al. fails to teach or suggest determining an approximate tube current modulation waveform from the at least one polynomial expression. That is, Toth et al. teaches storing values for tube current modulation waveform calculation. Thus, the tube current modulation waveform is determined from stored values and not from at least one polynomial expression generated to fit values evaluated at the plurality of magnitudes.

Therefore, notwithstanding the teachings of Hoffman, the art relied upon by the Examiner fails to teach or suggest that which is being claimed. As such, Applicant believes that claim 9 and the claims that depend therefrom are patentably distinct from the art of record.

Claims 12 and 13 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Toth et al. and Hoffman, and further in view of Toth. Applicant respectfully disagrees with the Examiner with respect to the art as applied, but in light of claims 12 and 13 depending from what is believed an otherwise allowable claim, Applicant does not believe additional remarks are necessary and, therefore, requests allowance of claims 12 and 13 at least pursuant to the chain of dependency.

The Examiner rejected claims 18-20 under 35 U.S.C. §103(a) as being unpatentable over Toth et al. in view of Toth. Applicant has amended claim 18 to call for determining a second tube current modulation waveform that approximates the first tube current modulation waveform from a polynomial fit of the evaluated portion of the first modulation waveform. Neither Toth et

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al. nor Toth teach or suggest determining a second tube current modulation waveform that approximates the first tube current modulation waveform from a polynomial fit of the evaluated portion of the first modulation waveform.

As stated above, Toth et al. teaches that "modulation profiles are stored as forty values which, when multiplied by the maximum tube current . . . , provide forty current commands for the x-ray controller 22 that determine x-ray tube current at forty successive 9° segments of gantry revolution." Col. 5, lns. 9-15. Toth et al. fails to teach or suggest polynomially fitting an evaluated portion of the stored modulation profiles. That is, the values for the current commands for each modulation profile are stored and are not determined from a polynomial fit.

Similarly, Toth teaches storing values for the modulation profiles. Toth teaches storing "twenty current commands for the x-ray controller 22 that determine x-ray tube current at twenty successive 18° segments of gantry revolution." Col. 5, lns. 4-10. Toth teaches calculation of the twenty current commands comprising the modulation profile. See col. 5, lns. 11-33. Like Toth et al., Toth fails to teach or suggest polynomially fitting an evaluated portion of the stored modulation profiles. Instead, Toth teaches storing the modulation profile current commands as 20 values to be used in calculating the modulation waveform for full gantry rotation.

Since neither Toth et al. nor Toth teaches or suggests determining a second tube current modulation waveform that approximates the first tube current modulation waveform from a polynomial fit of the evaluated portion of the first modulation waveform, Applicant believes that claim 18 and the claims that depend therefrom are patentably distinct from the art of record.

Therefore, in light of at least the foregoing, Applicant respectfully believes that the present application is in condition for allowance. As a result, Applicant respectfully requests timely issuance of a Notice of Allowance for claims 1-21.

An Amendment Transmittal Letter is enclosed.

Applicant appreciates the Examiner's consideration of these Amendments and Remarks and cordially invites the Examiner to call the undersigned, should the Examiner consider any matters unresolved.

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In the Drawings

The attached sheets of drawings replace all original sheets. Drawings changes have been made to Figure 4.

In Fig. 4, the reference numeral 84 has been changed to 83.

No new matter has been added.

Drawing Attachments: One Replacement Sheet of drawings